

Ice — A solid form of water. Water frozen, or reduced to the solid state by cold. Ice is a transparent, nearly colorless, crystalline, and brittle substance. Water in freezing expands about one eleventh of its volume, the specific gravity of ice being 0.9166, that of water at 4°C (39.2°F) being 1.0. Pure water freezes at 0°C (32°F), and ice melts at the same temperature.

Ice Age — (1) A cold period marked by episodes of extensive glaciation alternating with episodes of relative warmth. 2. (*Ice Age*) The most recent glacial period, which occurred during the *Pleistocene* epoch.

Ice Apron — A wedge-shaped structure for protecting a bridge pier from floating ice.

Ice Barrier — The outer margin of the antarctic ice sheet.

Iceberg — A massive piece of ice that breaks off and floats away from a *Glacier*. Icebergs occur as huge blocks, or in peaked forms of great variety and beauty. About one ninth of the bulk of an iceberg projects above sea level.

Iceblink — (1) A white or yellow streak in the sky near the horizon, caused by the reflection of light from an area of ice. Also call *Blink*. (2) A coastal ice cliff.

Icebound — Locked in or covered over by ice.

Icecap, or Ice Cap — An extensive dome-shaped or plate-like perennial cover of ice and snow that spreads out from a center and covers a large area, especially land. A very large ice cap is an *Ice Sheet*, or continental *Glacier*, as that of the antarctic continent.

Icefall — (1) The part of a glacier resembling a frozen waterfall that flows down a steep slope. (2) An avalanche of ice.

Icefield — A large, level expanse of floating ice that is more than eight kilometers (five miles) in its greatest dimension.

Icefog — A fog of ice particles. Also referred to as *Pogonip*.

Icefoot — A belt or ledge of ice that forms along the shoreline in Arctic regions.

Ice-Free — (1) Free of ice and open to travel or navigation, as an ice-free channel in a river. (2) Marked by a lack of obstructive ice.

Ice-Minus — Of or relating to a strain of genetically altered bacteria that are applied to crop plants to inhibit the formation of frost.

Ice Needle — A thin ice crystal floating high in the atmosphere in certain conditions of clear, cold weather.

Ice Nucleus — Any particle that serves as a nucleus in the formation of ice crystals in the atmosphere.

Ice-Out — The thawing of ice on the surface of a body of water, such as a lake.

Ice Pack — (1) A large area of floating pieces of ice driven together more or less closely. (2) A folded sac filled with crushed ice and applied to sore or swollen parts of the body to reduce pain and inflammation. Also referred to as an *Ice Bag*.

Ice Point — The temperature, equal to 1.0°C (33.8°F), at which pure water and ice are in equilibrium in a mixture at 1 atmosphere of pressure.

Icescape — A wide view or vista of a region of ice and snow.

Ice Sheet — A very large *Ice Cap*, also called continental glacier, as that of the antarctic continent.

Ice Storm — A storm in which snow or rain freezes on contact, forming a coat of ice on the surfaces it touches.

Ice Water — Chilled or iced water, especially served as a beverage.

Ichthyology — The study of fishes.

Ichthyosaurus (Ichthyosaur) [Nevada] — The chief genus of *Ichthyosauria*, also known by a prior name, *Proteosaurus*. An ancient, extinct marine reptile whose name means “fish-lizard” and who ruled the world’s oceans during the Mesozoic era some 200 million years ago. Fossil remains of the Ichthyosaur have been found on every continent except Africa. Possessing a fish-like body, porpoise-like snout, short neck, dorsal and caudal fins with limbs flattened into paddles, the Ichthyosaur ruled the seas for some 135 million years as the pre-eminent marine predator. The Ichthyosaur attained a maximum length of approximately 60–70 feet. The *Ichthyosaurus shonisaurus popularis* was the name given to a species discovered in Nevada in 1928. Some 40 of these reptiles became stranded in mud flats from a receding equatorial sea which once covered the state. The longest specimen

found at this site, located at an elevation of 7,000 feet in the Shoshone Mountain Range near the town of Berlin in northwestern Nye County, Nevada, was 55 feet long and represented the only complete fossilized skeleton of the species ever found in the United States. In 1977 the Nevada State Legislature named the *Ichthyosaurus Shonisaurus popularis* as Nevada's official state fossil.

Iceicle — A tapering spike of ice formed by the freezing of dripping or falling water.

Identification — (Statistics) A term used to describe the ability to determine an econometric model's structural parameters, i.e., the coefficients of the exogenous (or independent) variables. An econometric model is said to be exactly identified if the data support a unique set of parameters for the independent variables. A model is said to be *Under-identified* if there is no way of estimating all the structural parameters and *Over-identified* if more than one value is obtainable for some parameters.

Igneous Rock — (Geology) A rock formed by the solidification of molten materials (magma). The rock is extrusive (or volcanic) if it solidifies on the surface and intrusive (or plutonic) if it solidifies beneath the surface.

Illinoian — (Geology) Of or relating to one of the glacial stages of the *Pleistocene* epoch which occurred in North America, which consisted of the *Nebraskan* (first stage), *Kansan* (second stage), *Illinoian* (third stage), and *Wisconsin* (fourth stage).

Illuvial — Describing soil material, usually minerals and colloidal particles, that is removed from the upper soil horizon to a lower soil horizon. Illuvial deposits can form a *Hardpan*.

Illuviation — The deposition in an underlying soil layer of colloids, soluble salts, and mineral particles leached out of an overlying soil layer.

Imbibition — (Chemistry) Absorption of fluid by a solid or colloid that results in swelling.

Imhoff Cone — A clear, cone-shaped container used to measure the volume of settleable solids in a specific volume of water.

Imhoff Tank — An anaerobic sewage treatment tank in which solids are withdrawn from the bottom of the tank.

Immerge — To submerge or disappear in or as if in a liquid.

Immerse — To plunge, drop, or dip into or as if into a liquid, especially so as to cover completely.

Immersible — Capable of being completely immersed in water without suffering damage.

Immiscible — Applied to liquids which are insoluble in each other. The chemical property where two or more liquids or phases do not readily dissolve in one another, such as oil and water.

Impact Loads — (Flooding) Loads induced by the collision of solid objects on a structure carried by floodwater. Debris can include trees, lumber, displaced sections of structures, tanks, runaway boats, and chunks of ice. Debris impact loads are difficult to predict accurately, yet reasonable allowances must be made for them in the design of potentially affected structures.

Impact Zone — The spot on a wave where the water is just about to collapse and explode, the spot of greatest danger to and opportunity for a surfer.

Impaired — Water bodies that cannot reasonably be expected to attain or maintain applicable water quality standards, and at least one beneficial use shows some degree of degradation.

Imperial Valley [California] — A valley, southeast California, bounded by the Salton Sea on the north, the Chocolate Mountains on the east, and the desert ranges of the Santa Rosa and Vallecito mountains on the west. The valley, crossed by the border between the United States and Mexico, is part of a larger valley that extends south into Mexico; the Mexican section is called Mexicali Valley. Lying below sea level, and formerly an arid desert, the valley is now one of the richest agricultural areas in the world and the largest year-round irrigated agricultural area in North America as a result of irrigation by waters of the Colorado River. The first waters from the Colorado were brought in through the Imperial Canal, opened in 1901. The same source was tapped for the All-American Canal, completed in 1940 as part of the Hoover Dam irrigation system built by the U.S. government. This canal, which is 80 miles (129 kilometers) long and 200 feet (61 meters) wide, is the largest irrigation canal in the U.S. and supplies most of the water for the approximately 404,700 irrigated hectares (about 1 million acres, or 1,562 square miles) of land in the Imperial Valley.

Impermeability — Characteristic of geologic materials that limit their ability to transmit significant quantities of water under the pressure differences normally found in the subsurface environment.

Impermeable — Unable to transmit water; not easily penetrated. The property of a material or soil that does not allow, or allows only with great difficulty, the movement or passage of water. Not the same as *Nonporous*.

Impermeable Material — A material that has properties preventing movement of water through it. Nonporous.

Impervious — A term denoting the resistance to penetration by water or plant roots; incapable of being penetrated by water; non-porous.

Imperviousness — The portion of a sub-basin, sub-watershed, or watershed, expressed as a percentage, that is covered

by surfaces such as roof tops, parking lots, sidewalks, driveways, streets, and highways. Impervious surfaces are important because they will not absorb rainfall and, therefore, cause almost all of the rainfall to appear as surface runoff.

Impervious Soils — Soils that resist penetration by water.

Implied Right — A right that exists without ever being specifically expressed; an understood right.

Import (Water) — Water piped or channeled into an area.

Importation (of Water) — The act or process whereby water is brought into an area or region which would not naturally receive such waters. Typically, it refers to the artificial transport of water through aqueducts, canals, or pipelines from one water basin, drainage area, or *Hydrographic Area* to another, thereby affecting the natural surface and groundwater drainage and flow patterns in both the water exporting and importing areas. In terms of a *Water Banking* or *Water Marketing* concept, such actions to move water from areas of low use to areas of high use place a more realistic monetary value on water as a scarce economic commodity and result in enhanced economic efficiency by putting existing water resources, wherever located, to more productive economic use. However, considerable public concern and controversy surround this practice. These concerns deal primarily with issues relating to altering the natural flows of both surface and ground waters, adverse environmental and habitat impacts on water exporting areas, the limitations placed on the long-term growth and development of the water exporting region or hydrographic area, the potentially adverse hydrologic effects on groundwater (water table and aquifer) conditions in the exporting area as well as the generally unknown effects on surrounding hydrographic areas and aquifer conditions, and the dependency acquired by the water importing area to continued diversions and water importations. The concept of a public policy limiting an area's development to its natural ability to support population growth only through existing and readily available natural resources, particularly water, is referred to as an *Antediluvian Policy*.

Impound — To accumulate and store water as in a reservoir.

Impoundment — (1) Generally, an artificial collection or storage of water, as a reservoir, pit, gugout, or sump. (2) A body of water such as a pond, confined by a dam, dike, floodgate or other barrier. It is used to collect and store water for future use. (3) (Water Quality) Generally an artificial collection and storage area for water or wastewater confined by a dam, dike, floodgate, or other barrier.

Improved Irrigated Acreage — Refers to farm acreage which has been leveled, planed and serviced by improved conveyance and control structures.

Inactive Storage — Lake or reservoir storage not available for release without pumping.

Inch — A fall, as of rain or snow, sufficient to cover the surface to the depth of one inch (2.54 centimeters).

Inch (In., in.) — The depth to which a drainage area would be covered with water if all the runoff for a given time period was uniformly distributed on it.

Inch-Degrees — The product of inches of rainfall times temperature in degrees above freezing (Fahrenheit), used as a measure of the snowmelting capacity of rainfall.

In-Channel Storage — Water storage volume in a canal above the minimum water level required for conveyance.

In-Channel Use — See *Instream Use*.

Inchoate Water Right — An unperfected water right. See *Perfected Water Right*.

Incidence — (Statistics) The rate of occurrence of a specific event within a given number of observations over a standard time period.

Incidental Recharge — Ground water recharge (infiltration) that occurs as a result of human activities unrelated to a recharge project, for example, irrigation and water diversion (unlined canals). Also see *Artificial (or Induced) Recharge*, *Natural Recharge*, and *Perennial Yield*.

Incidental Waste Water Reclamation — Treated waste water returned to fresh-water streams or other water bodies. Additional use made of this treated waste water is only incidental to waste water treatment and disposal.

Incineration — (Water Quality) A treatment technology involving the destruction of waste by controlled burning at high temperatures, e.g., burning sludge to remove the water and reduce the remaining residues to a safe, non-burnable ash that can be disposed of safely on land, in some waters, or in underground locations.

Incised Channel (River) — (1) A river which cuts its channel through the bed of the valley floor, as opposed to one flowing on a floodplain; its channel formed by the process of degradation. (2) A stream that has degraded and cut its bed into the valley bottom. Indicates accelerated and often destructive erosion.

Inclined Staff Gage — A gage which is placed on the slope of a stream bank and graduated so that the scale reads directly in a vertical depth.

Inclinometer (Inclometer) — An instrument, usually consisting of a metal or plastic tube, inserted in a drill hole and a sensitized monitor either lowered into the tube or fixed within the tube. This measures at differential points the

tube's inclination to the vertical. By integration, the lateral position at different levels of the tube may be found relative to a point, usually the top or bottom of the tube, assumed to be fixed. The system may be used to measure settlement.

Incubate — To maintain environmental conditions that are optimum for the growth of bacteria. For example, coliforms grow best when held at 37°C (98.6°F).

Independent Variable — (Statistics) A measurable quantity that, as it takes different values, can be used to predict the value of a *Dependent Variable*. Also referred to as the *Exogenous Variable* or variable to be explained (*Explained Variable*).

Index Model — A hydrologic computer model based on empirical, statistical relationships.

Index of Wetness — The precipitation for a given year expressed as a ratio to the mean annual precipitation.

Indirect Discharge — The introduction of pollutants from a non-domestic source into a publicly owned waste-treatment system. Indirect dischargers can be commercial or industrial facilities whose wastes enter local sewers.

Indra — (Hinduism) A principal Vedic deity associated with rain and thunder.

Industrial Waste — Unwanted materials from an industrial operation; may be liquid, sludge, or hazardous waste. Also see *Industrial Water Use (Withdrawals)*.

Industrial Water Use (Withdrawals) — Industrial water use includes water used for processing activities, washing, and cooling. Major water-using manufacturing industries include food processing, textile and apparel products, lumber, furniture and wood products, paper production, printing and publishing, chemicals, petroleum, rubber products, stone, clay, glass and concrete products, primary and fabricated metal industries, industrial and commercial equipment and electrical, electronic and measuring equipment and transportation equipment. The terms "water use" and "water withdrawals" are equivalent, but not the same as *Consumptive Use* as they do not account for return flows. Also see *Commercial Water Use (Withdrawals)*.

Indicator — (Ecology) A quantitative or qualitative variable which can be measured or described and which when observed periodically demonstrates trends. *Ecosystem* indicators track the magnitude of stress, habitat characteristics, exposure to the stressor, or ecological response to exposure.

Indicator (Organism) — (Water Quality) An organism, species, or community that shows the presence of certain environmental conditions.

Indicator Bacteria — (Water Quality) Nonpathogenic bacteria whose presence in water indicate the possibility of pathogenic species in the water.

Indicator Gage — A gage that shows by means of an index, pointer, dial, etc., the instantaneous value of such characteristics as depth, pressure, velocity, stage, discharge, or the movements or positions of water-controlling devices.

Indicator Species — (Environmental) Any organism that by its presence or absence, its frequency, or its vigor indicates a particular property of its surrounding environment. A species whose presence is a sign that certain environmental conditions exist. Also see *Management Indicator Species*.

Indicator Tests — (Water Quality) Tests for a specific contaminant, group of contaminants, or constituent which signals the presence of something else. For example, the presence of non-pathogenic coliforms indicate the presence of pathogenic bacteria.

Indigenous — Existing, growing, or produced naturally in a region.

Indirect Water Uses — Uses of water that are not immediately apparent to the consumer. For example, a person indirectly uses water when driving a car because water was used in the production process of steel and other automotive components.

Induced Recharge — The designed (as opposed to the natural or incidental) replenishment of ground water storage from surface water supplies. There exist five (5) common techniques to effect artificial recharge of a groundwater basin:

- [1] **Water Spreading** consisting of the basin method, stream-channel method, ditch method, and flooding method, all of which tend to divert surface water supplies to effect underground infiltration;
- [2] **Recharge Pits** designed to take advantage of permeable soil or rock formations;
- [3] **Recharge Wells** which work directly opposite of pumping wells although have limited scope and are better used for deep, confined aquifers;
- [4] **Induced Recharge** which results from pumping wells near surface supplies thereby inducing higher discharge towards the well; and
- [5] **Wastewater Disposal** which includes the use of secondary treatment wastewater in combination with spreading techniques, recharge pits, and recharge wells to reintroduce the water to deep aquifers thereby both increasing the available groundwater supply and also further improving the quality of the

wastewater.

Also referred to as *Artificial Recharge*. Also see *Natural Recharge*, *Incidental Recharge*, and *Perennial Yield*.

Industrial, Self-supplied Water — Water withdrawn from privately developed sources and delivered through water systems established entirely or primarily for commercial and industrial use. Includes water used by mining, manufacturing, military establishments, educational and penal institutions, golf courses, hotels, motels, restaurants, casinos and other small businesses.

Industrial Wastewater Facility — Refers to those facilities that produce, treat or dispose of wastewater not otherwise defined as a domestic wastewater. May include the runoff and leachate from areas that receive pollutants associated with industrial or commercial storage, handling, or processing.

Industrial Water Use (Withdrawals) — Water used for industrial purposes such as fabricating, manufacturing, processing, washing, and cooling, and includes such industries as steel, chemical and allied products, paper and allied products, mining, and petroleum refining. The water can be obtained from a *Public Water Supply System* or may be self-supplied. The terms “water use” and “water withdrawals” are equivalent, but not the same as *Consumptive Use* as they do not account for return flows. Also see *Self-Supplied Water*.

Infaua — Aquatic animals that live in the substrate of a body of water, especially in a soft sea bottom.

Inference, Bayesian — (Statistics) Bayes’ theorem recognizes that a decision maker usually has some expectation (an *a priori* model) of what will occur even before acquiring information, and provides a procedure for using new evidence to produce a revised *a posteriori* estimate of probability. Also see *Statistical Inference* and *Classical Inference*.

Inference, Classical — (Statistics) Statistical inference is based on two basic premises: (1) The sample data constitute the only relevant information; and (2) The construction and assessment of the different procedures for inference are based on long-run behavior under essentially similar circumstances. Also see *Statistical Inference* and *Bayesian Inference*.

Inference, Statistical — (Statistics) The area of statistics that describes the procedures by which we use the observed data (the sample) to draw conclusions about the population from which the data came or about the process by which the data were generated. Our assumption is that there is an unknown process that generates the data and that this process can be described by a probability distribution, i.e., a likelihood of occurring. Statistical inference can be classified as *Classical Inference* and *Bayesian Inference*.

Infiltrate, also Infiltration — (1) The rate of movement of water from the atmosphere into the soil; that portion of rainfall or surface runoff that moves downward into the subsurface rock and soil; the entry of water from precipitation, irrigation, or runoff into the soil profile. (2) The flow of a fluid into a substance through pores or small openings; to cause a liquid to permeate a substance by passing through its interstices or pores. It connotes flow into a substance in contradistinction to the word *Percolation*, which connotes flow through a porous substance. Also the process whereby water passes through an interface, such as from air to soil or between two soil horizons. (3) The technique of applying large volumes of waste water to land to penetrate the surface and percolate through the underlying soil.

Infiltration — The flow of fluid into a substance through pores or small openings. The word is commonly used to denote the flow of water into soil.

Infiltration and Inflow — (Water Quality) The entrance of groundwater (infiltration) or of surface water (inflow) into sewer pipes. Groundwater can seep through defective pipe joints or cracked pipe sections; roof or basement drains are sources of surface water inflow. Excessive infiltration and inflow can cause sewers to back up or can overload sewage treatment plants, causing a reduction in treatment time or a complete bypass of the treatment process during periods of significant rainfall.

Infiltration Capacity — The maximum rate at which the soil, when in a given condition, can absorb falling rain or melting snow.

Infiltration Capacity Curve — A graph showing the time variation of infiltration capacity. A standard infiltration capacity curve shows the time variation of the infiltration rate which would occur if the supply were continually in excess of infiltration capacity.

Infiltration Capacity, Ultimate — The relatively steady, slow, infiltration capacity which exists after a sufficiently long period of infiltration at capacity rate.

Infiltration Gallery — A sub-surface groundwater collection system, typically shallow in depth, constructed with open-jointed or perforated pipes that discharge collected water into a watertight chamber from which the water is pumped to treatment facilities and into the distribution system. Usually located close to streams or ponds.

Infiltration Index — The average rate of infiltration, in inches per hour, derived from a time intensity graph of rainfall, so that the volume of rainfall in excess of this rate equals the total direct runoff. Also referred to as a “Ö”

(Phi) or “W” index.

Infiltration Rate — Rate of downward movement or flow of water from the surface into the soil. (1) The rate at which infiltration takes place, expressed in depth of water per unit time, usually in inches per hour. (2) The rate, usually expressed in cubic feet per second, or million gallons per day per mile of waterway, at which ground water enters an infiltration ditch or gallery, drain, sewer, or other underground conduit.

Infiltrometer — An instrument which determines the rate and amount of water percolating into the soil by measuring the difference between the amount of water applied and that which runs off. Essentially, the infiltrometer consists of a sprinkling mechanism (rain simulator) which provides a rather uniform sprinkling of water to a prescribed area at prescribed rates and size drops (impact), a rain gage (either total or intensity), and a catchment basin or receptacles in which either the rate or total flow of surface runoff is measured. Infiltration or amount absorbed by the soil is usually expressed in inches (of water) per standard interval of time.

Inflatable Dam—A dam constructed of heavy-duty rubber or similar material and inflated with air or water and used for typically small-scale impoundment of flood flows or as flashboards for regulating the overflow of larger dams. Inflatable dams were first developed and used in the 1950s in the Los Angeles, California area. Initially, they were typically inflated with water; however, with improvements in structural materials and design, air is now the preferred inflation medium. Inflatable dams are used in situations requiring small impoundments (say, 100-250 acre-feet) and flexibility of operations. For example, such structures are used to control flood flows, deflating slowly when overflowed and then inflating again once flood debris and peak flows have passed. Inflatable dams are also used in lieu of flashboards on the top of dams providing easier and safer alternatives. Currently (1998) there exist approximately 1,900 of these dams worldwide and 50 are in the United States.

Inflow — (1) The act or process of flowing in or into. (2) Something that flows in or into, as all water that enters a *Hydrologic System*. (3) (Water Quality) Water, other than wastewater, that enters a sanitary sewer system (including sewer service connections) from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, *Infiltration*.

Inflow Design Flood — The maximum probable flood defined as the largest flood that can be expected to occur on a given stream at a selected point. This flood is used for design to prevent failure of the dam and is determined by the U.S. Department of the Interior, Bureau of Reclamation.

Influent — Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Influent Seepage — The movement of gravity water in the *Zone of Aeration* from the ground surface toward the water table.

Influent Stream — A stream that contributes water to the *Zone of Saturation* and to *Bank Storage*. This term has generally been replaced by the term *Losing Stream*. Also see *Stream*.

Influent Water — Water that flows into sink holes, open cavities, and porous materials and disappears into the ground.

Information — (Data Analysis) The synthesis and manipulation of *Data* through various analytical, tabular, graphical, presentation, or other techniques into a format that readily lends itself to hypothesis testing, planning, and decision making. The fundamental distinction between the data and the information is that the data represents the original observations of an event, characteristic, or phenomenon whereas information represents the transformation of that data, possibly along with the combination of other relevant data and/or other information, into formats that may be used for decision-making purposes.

Information Collection Rule (ICR) — A rule promulgated by the *U.S. Environmental Protection Agency (EPA)* which took effect in January 1997 requiring water districts serving more than 100,000 connections to monitor water supplies for *Cryptosporidium parvum*.

Information Management — (Data Analysis) The manipulation, re-organization, analysis, graphing, charting, and presentation of data for specific management and decision-making purposes. Typically, a fundamental distinction is made between information and data, which constitutes the raw numbers (or descriptions, in the case of qualitative data). Also see *Data Management*.

Infrastructure — (1) An underlying base or foundation, especially for an organization or a system. (2) The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, water and wastewater treatment systems, and public institutions including schools, post offices, and prisons.

Infuse — To steep in liquid (as water) without boiling so as to extract the soluble constituents or principles.

Initial Detention — The volume of water on the ground, either in depressions or in transit, at the time active runoff

begins. It is that part of precipitation that does not appear either as infiltration or runoff at the time active runoff begins. It includes interception by vegetal cover, depression storage, and evaporation during precipitation, but does not include surface detention.

Initial Loss — Rainfall which precedes the beginning of surface runoff. It includes interception, surface wetting, and infiltration, unless otherwise specified.

Initial Storage — That portion of precipitation required to satisfy interception by vegetation, the wetting of the soil surface, and *Depression Storage*.

Initial Water Deficiency — The quantity, usually expressed in depth of water in inches on a unit area, by which the actual water content of a given soil zone (usually the *Root Zone*) is exceeded by the field capacity of that zone at the beginning of the rainy season. Also referred to as *Initial Moisture Deficiency*.

Injection — Generally refers to a system of artificially introducing surface water into the ground water system as a means of storage or recharge. Most typically, this includes the use of *Recharge Wells* which work directly opposite of pumping wells to inject surface water into underlying formations. Depending on the water-bearing formation, these methods may have limited usefulness and are generally better used for pumping water into deep, confined aquifers. (Water Quality) Refers to a system of subsurface disposal of brine effluent into an acceptable formation. Also see *Induced Recharge*.

Injection Well — Refers to a well constructed for the purpose of injection treated wastewater directly into the ground. Wastewater is generally forced (pumped) into the well for dispersal or storage into a designated aquifer. Injection wells are generally drilled into nonpotable aquifers, unused aquifers, or below freshwater levels.

Injection Well Classes — Classifications of the *U.S. Environmental Protection Agency (EPA)* that determine the permit requirements of an *Injection Well*.

- [1] **Class I** — A well into which liquid hazardous wastes or other fluids are pumped down, with the fluids being injected into an underground formation below the lowest underground source of drinking water that is within a one-quarter mile radius of the well;
- [2] **Class II** — A well used to dispose of fluids produced by oil and gas wells, to introduce fluids for enhanced oil recovery, or for liquid hydrocarbon storage;
- [3] **Class III** — A well used to pump fluids underground for mineral extraction;
- [4] **Class IV** — A well used to re-inject treated fluid from a superfund cleanup site into or above an underground formation within a one-quarter mile radius of the well (the use of these types of wells is currently banned by the EPA);
- [5] **Class V** — Wells not included in Classes I–IV, mainly shallow industrial disposal wells or *Recharge Wells* (see Appendix B–10, Class V Injection Well Classifications and Descriptions).

Injection Zone — A geological formation receiving fluids through an *Injection Well*.

Inland Freshwater Wetlands — Swamps, marshes, and bogs found inland beyond the coastal saltwater wetlands.

Inlet — A recess, such as a bay or cove, along a coast. A stream or bay leading inland, as from the ocean; an estuary. Also, a narrow passage of water, as between tow islands. A drainage passage, as to a culvert.

In-Line Filtration — A pre-treatment method in which chemicals are mixed by the flowing water; commonly used in pressure filtration installations. Eliminates need for *Flocculation* and *Sedimentation*.

Inline Reservoir — A reservoir constructed in line with the canal used to regulate flow for a balanced operation.

Inorganic Matter — Chemical substances of mineral origin, or more correctly, not of basically carbon compounds.

Input-Output (Economic Impact) Analysis — (Data Analysis) An analytical technique used to assess economic, fiscal, resource, and environmental impacts to an economic system from a change to one or more economic sectors. The concept of input-output analysis, or economic impact modeling techniques is based on a *mapping*, or detailed delineation, of the economic linkages and financial flows and transactions between and among the various industry sectors of an economy (also see *Standard Industrial Classification [SIC] Codes*). The fundamental premise is that changes in production levels of an economy's basic, or export-oriented, industries, derived from either changes in output or changes in demand, will, through various and extensive inter-industry linkages, result in an iterative process of spending, income creation, and re-spending, thereby changing the production levels of other, directly and indirectly related industries. The input-output process results in a set of *multipliers* which prescribe the total *economic, fiscal, resource, or environmental effects* for a unit change to a given industry sector. Multipliers may be developed for any factor input which may be measured in terms of a unit of output. Typical *economic impacts* include total economic output, employment, incomes, population, housing units. Typical *fiscal impacts* include tax revenues generated, tax revenue expenditures, and anticipated economic infrastructure requirements. Typical *resource impacts* may include commercial and residential water use, electrical power use, and land use. Typical *environmental impacts* would include water and air pollution effects, and the like. Limitations to the input-output

impact analysis technique include its extensive and detailed *Primary Data* requirements (versus *Secondary Data*), the fact that multipliers are derived only for a single point in time, and the assumption of a linear (constant) relationship between inputs and outputs. Even so, this technique represents a robust analytical methodology for assessing near-term impacts on a comprehensive basis.

Insecticides — Chemicals used to kill or otherwise control insects.

Inset — An inflow, as of water; a channel.

Inset Fan — A special case of the floodplain of a commonly ephemeral stream that is confined between fan remnants, basin-floor remnants, *Ballenas*, or closely opposed fan toeslopes. Its transversely-level cross section is evidence of alluviation of a *Fluve*. It must be wide enough that raw channels cover only a fraction of this component landform's surface.

In Situ — In place. An *in situ* environmental measurement is one that is taken in the field, without removal of a sample to the laboratory.

In-Situ Biodegradation — (Environmental) The treatment of soil in place to encourage contaminants to break down. It involves aerating the soil and adding nutrients to promote growth of microorganisms.

In-Situ Stripping — A treatment system that removes or "strips" volatile organic compounds from contaminated ground or surface water by forcing an airstream through the water and causes the compounds to evaporate.

In-Situ Vitrification — (Environmental) A technology used to treat hazardous waste substances in soils. This process electrically melts the waste media at extremely high temperatures, then allows it to cool, creating an extremely stable, insoluble, glass-like solid. The contaminants are destroyed or immobilized and the total volume of material is reduced.

Instantaneous Discharge — The discharge at a particular instant of time.

Instream Aeration — The addition of air to a flowing stream to maintain the dissolved oxygen content of the water at an acceptable level.

Instream Flow — (1) The amount of water remaining in a stream, without diversions, that is required to satisfy a particular aquatic environment or water use. (2) Nonconsumptive water requirements which do not reduce the water supply; water flows for uses within a defined stream channel. Examples of instream flows include:

- [1] **Aesthetics** — Water required for maintaining flowing streams, lakes, and bodies of water for visual enjoyment;
- [2] **Fish and Wildlife** — Water required for fish and wildlife;
- [3] **Navigation** — Water required to maintain minimum flow for waterborne commerce;
- [4] **Quality Dilution** — Water required for diluting salt and pollution loading to acceptable concentrations; and
- [5] **Recreation** — Water required for outdoor water recreation such as fishing, boating, water skiing, and swimming.

Also referred to as *Instream Use*.

Instream Flow Needs — Those habitat requirements within the running water *Ecosystem* related to current velocity and depth which present the optimum conditions of density (or diversity) or physiological stability to the aquatic organisms being examined at various life cycle stages.

Instream Flow Requirement — The flow required in a stream to maintain desired instream benefits such as navigation, water quality, fish propagation, and recreation.

Instream Flow Rights — A doctrine used to preserve minimum river or stream flows for fish and wildlife, recreation, water quality, and scenic beauty, among other public purposes. Such rights are limited to the use of water within its natural course, not requiring diversion.

Instream Use — Typically, non-consumptive uses of water that do not require diversion from its natural watercourse (e.g., fish and other aquatic life, recreation, navigation, esthetics, and scenic enjoyment). Hydroelectric power production water use is also considered a non-consumptive, but may require temporary diversion from the natural stream flow. Also referred to as *In-Channel Use*, *Nonwithdrawal Use*, or *Instream Flow*.

Insulated Streams — Streams or a reach of a stream that neither contribute water to the zone of saturation nor receive water from it. Such streams are separated from the zones of saturation by an impermeable bed. Also see *Stream*.

Intangible Flood Damage — Estimated damage done by disruption of business, danger to public health, shock, loss of life, and other factors not directly measurable.

Integrated (Water) Resource Planning (IRP) — A comprehensive, interdisciplinary approach to water resource planning that encompasses water resource assessment, demand considerations, analysis of alternatives, risk management, resource diversity, environmental considerations, least-cost analysis, multidimensional modeling, and participatory decision making and public input, among other factors. Integrated Resource Planning begins with

specific policy objectives that are applied to extensive lists of options for water supply sources, distribution systems, or other operational requirements. The options are then narrowed after evaluating demand requirements, environmental impacts, conservation options, costs, risks, and other aspects of a project. IRP involves a dynamic process of assessing demand and supply conditions and creatively integrating alternatives and new technologies. While the concepts of IRP are relatively new to the process of water planning, it has been used extensively in the energy industry. As a planning process it helps decision makers select the best mix of water resources, facilities, and conservation measures to meet water demands. In addition to traditional planning techniques, IRP also

- [1] Includes extensive public involvement;
- [2] Considers both supply-side (resources and facilities) and demand-side (conservation) alternatives as ways of meeting demands;
- [3] Considers goals and objectives in addition to dollar costs (e.g., environmental concerns, public acceptability, etc.);
- [4] Considers uncertainty in demand forecasts, regulations, etc.; and
- [5] Considers the effect of water rates on water demands.

Intensive Crops — Crops generally grown under irrigation in the Western United States requiring large inputs of labor and capital. Examples include potatoes, sugar beets, fruit, and corn.

Interbasin Transfer (of Water) — A transfer of water rights and/or a diversion of water (either groundwater or surface water) from one *Drainage* or *Hydrographic Basin* to another, typically from the basin of origin to a different hydrologic basis. Also referred to as *Water Exports* and/or *Water Imports*.

Intercepting Drain — A drain constructed at the upper end of an area to intercept and carry away surface or ground water flowing toward the area from higher ground. Also referred to as *Curtain Drain*.

Interception (Hydrology) — (1) The process whereby the downward movement of precipitation is interrupted and redistributed. (2) The amount of water lost to soil moisture by this process, often expressed as a percent. (3) The process of storing rain or snow on leaves and branches which eventually evaporates back to the air. Interception equals the precipitation on the vegetation minus streamflow and throughfall.

Interceptor Sewers — Large sewer lines that, in a combined system, control the flow of sewage to the treatment plant. In a storm, they allow some of the sewage to flow directly into a receiving stream, thus keeping it from overflowing onto the streets. Also used in separate systems to collect the flows from main and trunk sewers and carry them to treatment points.

Interdisciplinary Approach — Addressing problems by means of different methodologies, education, training, and disciplines which, when shared and combined, provide for new, more innovative and more comprehensive solutions.

Interface — The common boundary between two substances such as a water and a solid, water and a gas, or two liquids such as water and oil.

Interfan-Valley Drainageway — A drainageway or drainage system rising as on fan drainageways that combine to form a trunk drainageway down the axis of an inter-fan valley, i.e., down the topographic low between two adjacent mountain-front alluvial fans. Fanhead trenches may empty into interfan-valley drainageways. The latter may debouch onto or cross the fan piedmont.

Interference (Wells) — A change in the water level of one well caused by the pumping at another well. The condition occurring when the area of influence of a water well comes into contact with or overlaps that of a neighboring well, as when two wells are pumping from the same aquifer or are located near each other.

Interflow — (1) That movement of water of a given density in a reservoir or lake between layers of water of different density, usually caused by the inflow of water either at a different temperature, or with different silt or salt contents. (2) Runoff due to that part of the precipitation which infiltrates the surface soil (but not to the water table) and moves laterally through the upper soil horizons toward the stream channels. The interflow is included in direct runoff and is part of the *Flood Hydrograph*.

Interfluve — (1) The area between rivers; especially the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. (2) The elevated areas between two *Fluves* (drainageways) that sheds water to them.

Interglacial — Occurring between *Glacial Epochs*. A comparatively short period of warmth during an overall period of *Glaciation*.

Intermediate Zone — The subsurface water zone below the *Root Zone* and above the *Capillary Fringe*.

Intermittent — Alternately containing and empty of water as an intermittent lake.

Intermittent Stream — A stream that carries water only part of the time, generally in response to periods of heavy runoff either from snowmelt or storms; a stream or part of a stream that flows only in direct response to

precipitation. It receives little or no water from springs or other sources. It is dry for a large part of the year, generally more than three months. Flow generally occurs for several weeks or months in response to seasonal precipitation, due to groundwater discharge, in contrast to the *Ephemeral Stream* that flows but a few hours or days following a single storm. Also referred to as *Seasonal Streams*. Also see *Stream*.

Intermittently Exposed — A water regime in wetland classification in which surface water is present throughout the year except in years of extreme drought.

Intermittently Flooded — A water regime in wetland classification in which the substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity.

Intermontane Basin — A generic term for wide structural depressions between mountain ranges that are partly filled with alluvium and are called “valleys” in the vernacular. Intermontane basins may be drained internally (*Bolsons*) or externally (*Semi-Bolsons*).

Internal Drainage — (1) Movement of water down through soil to porous aquifers or to surface outlets at lower elevations. (2) Drainage within a basin that has no outlet.

Internal Erosion (of a Dam) — The progressive development of erosion by seepage, appearing downstream of the dam as a hole or seam discharging water that contains soil particles. Also referred to as *Piping*.

Internal Soil Drainage — The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are none, very slow, medium, rapid, and very rapid.

International Water Treaty — An agreement between the United States and a foreign nation pertaining to water resources involving both nations. Such treaties supersede state law. Presently, the U.S. has such treaties with Mexico and Canada relating to shared water resources.

Interpolate/Interpolation — (Data Analysis) The fitting of data values between observed values. Frequently interpolation will be used when certain periods of data are missing, but data surrounding these missing data values is available. Interpolation techniques must be careful so as to attempt to repeat the patterns of the missing data with respect to trend, seasonality, and longer-term cycles.

Interstadial — (Geology) Long intervals of *Desiccation* occurring between *Pluvial* episodes.

Interstate Allocation [Nevada and California] — An agreement between the states of Nevada and California over the use of the waters of Lake Tahoe and the Truckee, Carson, and Walker rivers which was ratified by California (1970) and Nevada (1971), but was never ratified by Congress. Despite this, both states have enacted legislation to enforce to the allocation of the Truckee, Carson, and Walker rivers between these two states. Subsequently, in 1990 many of the compact’s provisions dealing with the waters of Lake Tahoe and the Truckee and Carson rivers became formalized under *Public Law 101-618* (the *Negotiated Settlement*).

Interstate Carrier Water Supply — A source of water for drinking and sanitary use on planes, buses, trains, and ships operating in more than one state. These sources are federally regulated.

Interstate Water Compact — (1) Broadly, an agreement between two or more states regarding competing demands for a water resource which are beyond the legal authority of one state alone to solve. (2) States administer water rights within their own political boundaries; however, the process becomes more complicated when involving an interstate body of water (*Interstate Water*). Under these conditions there are three possible ways to achieve an interstate allocation of water: (1) A suit for equitable apportionment brought by the states in the U.S. Supreme Court; (2) a Congressional act; and (3) an interstate compact. An interstate compact is an agreement negotiated between states, adopted by their state legislatures, and then approved by Congress. Once an allocation of interstate water is determined by such a means, the individual states may then issue water rights to its share of the water through their normal administrative process. Interstate compacts have been traditionally used in making water allocations in the western states. Also see *Interstate Allocation [Nevada and California]*.

Interstate Waters — According to federal law, interstate waters are defined as: (1) rivers, lakes and other waters that flow across or form a part of state or international boundaries; (2) waters of the Great Lakes; and (3) coastal waters whose scope has been defined to include ocean waters seaward to the territorial limits and waters along the coastline (including inland streams) influenced by the tide.

Interstices — The openings or pore spaces in a rock, soil, and other such material. In the *Zone of Saturation* they are filled with water. Synonymous with *Void* or *Pore*.

Interstitial — Referring to the *Interstices* or pore spaces in rock, soil, or other material subject to filling by water.

Interstitial Monitoring — The continuous surveillance of the space between the walls of an underground storage tank.

Interstitial Pressure — (Hydraulics) The upward pressure of water in the pores or *Interstices* of a material.

Interstitial Water — Water in the pore spaces of soil or rock.

- Intertidal Zone** — That area of coastal land that is covered by water at high tide and uncovered at low tide.
- Intervale** — (New England) A tract of low-lying land, especially along a river.
- Intrabasin Transfer (of Water)** — Transfers of water within the same water basin or hydrographic area.
- Intramontane Basin** — A relatively small structural depression within a mountain range that is partly filled with alluvium and commonly drains externally through a narrower mountain valley.
- Intrinsic Permeability** — Pertaining to the relative ease with which a porous medium can transmit a liquid under a hydraulic or potential gradient. It is a property of the porous medium and is independent of the nature of the liquid or the potential field.
- Intrusive** — Where a fluid (e.g., magma) has penetrated into or between other rocks, but has solidified before reaching the surface.
- Intrusive Bedrock** — (Geology) Denoting igneous rocks in a molten state which have evaded other, older rock formations and cooled below the surface of the earth. These magmas are slow-cooling and form coarse-textured rocks, such as granite.
- Inundate** — (1) To cover with water, especially floodwaters. (2) To overwhelm as if with a flood; swamp.
- Inundation** — The covering by water of lands not normally so covered.
- Inundation Map** — A map delineating the area that would be inundated in the event of a dam failure.
- Invasive Plant** — A plant that moves in and takes over an *Ecosystem* to the detriment of other species; often the result of *Environmental Manipulation*.
- Inventory** — A scientific survey of natural resources, e.g., plants, animals, water, timber, etc.
- Inventorying** — Gathering data needed for analyses and evaluation of the status or condition of a specific universe or area of concern.
- Inversion** — An atmospheric condition where a lower layer of cool air is trapped below an upper layer of warm air. May cause serious air pollution problems.
- Inverted Siphon** — A closed pipeline with its end sections above the middle section, used for crossing under drainage channels, roadways, depressions, or other structures. The term is common but misleading as there is no siphon action involved. Also referred to as a *Sag Pipe*.
- Ion** — (1) An atom or molecule that carries a net charge (either positive or negative) because of an imbalance between the number of protons and the number of electrons present. If the ion has more electrons than protons, it has a negative charge and is called an anion; if it has more protons than electrons it has a positive charge and is called a cation. (2) (Water Quality) An electrically charged atom that can be drawn from waste water during electro dialysis.
- Ion Exchange** — The substitution of one *Ion* for another in certain substances. Either *Anion Exchange* or *Cation Exchange* is possible. The most common cation exchange involves the conversion of *Hard Water* to *Soft Water* by means of a *Water Softening* process. Hard water contains the divalent ions of calcium (Ca^{+2}) and magnesium (Mg^{+2}), which cause soap and detergents to form precipitates in water. A *Water Softener* consists of a resin that is saturated with sodium ions (Na^+). As hard water percolates through the resin, the ions of calcium or magnesium are removed as they attach to the resin, thus releasing (being exchanged for) sodium ions.
- Ion Exchange Treatment** — A common water-softening technique often found on a large scale at water purification plants that remove some organics and radium by adding calcium oxide or calcium hydroxide to increase the pH to a level where the metals will precipitate out.
- Ionic Strength** — The weighted concentration of ions in solutions, computed by the formula:
- $$\text{Ionic Strength} = \frac{1}{2} \sum (Z_i^2 C_i)$$
- where:
- Z = the charge on a particular ionic species; and
- C = the concentration of a particular ionic species.
- Ionosphere** — The upper layer of the *Atmosphere* above the *Stratosphere*, from a distance of about 80 kilometers (50 miles) from the earth's surface. Incoming solar radiation is sufficiently intense to cause the ionization of the sparse gas molecules present.
- Irrecoverable Losses** — Water lost to a salt sink or lost by evaporation or evapotranspiration from a conveyance facility, drainage canal, or in fringe areas of cultivated fields.
- Irregularly Exposed** — A water regime in wetland classification in which the land surface is exposed by tides less often than daily.
- Irregularly Flooded** — A water regime in wetland classification in which tidal water alternately floods and exposes the land surface less often than daily.

Irrigable Land — (1) Land capable of being irrigated by any method. (2) (USBR) Arable land under a specific project plan for which irrigation water is, can be, or is planned to be provided and for which facilities necessary for sustained irrigation are provided or are planned to be provided. For the purpose of determining the areas to which acreage limitations are applicable, it is that acreage possessing permanent irrigated crop production potential, after excluding areas occupied by and currently used for homesites, farmstead buildings, and related permanent structures such as feed lots, equipment storage yards, permanent roads, permanent ponds, and similar facilities, together with roads open for unrestricted use by the public. Areas used for field roads, farm ditches and drains, tailwater ponds, temporary equipment storage, and other improvements subject to change at will by the landowner are included in the irrigable acres.

Irrigate — (1) To supply (dry land) with water by means of ditches, pipes, or streams; to water artificially. (2) To wash out (a body cavity or wound) with water or a medicated fluid. (3) To make fertile or vital as if by watering.

Irrigated Acreage — The land area that is irrigated, which is equivalent to total irrigated crop acreage minus the amount of acreage that was multi-cropped.

Irrigated Area — The area upon which water is artificially applied. This excludes farm roads, irrigation ditches, and farmsteads.

Irrigated Crop Acreage — The total amount of land area that is irrigated, including acreage that is double cropped.

Irrigated Cropland — All lands being supplied water by artificial means, excluding waterfowl refuges, that are being used for the production of orchard, field, grain crops and pasture.

Irrigated Land — Land receiving water by controlled artificial means for agricultural purposes from surface or subsurface sources.

Irrigation — (1) The controlled application of water for agricultural purposes through man-made systems to supply water requirements not satisfied by rainfall; applying water to soil when rainfall is insufficient to maintain desirable soil moisture for plant growth. (2) The application of water to soil for crop production or for turf, shrubbery, or wildlife food and habitat. A listing of the types of irrigation systems includes:

- [1] **Center-Pivot** — Automated sprinkler irrigation achieved by automatically rotating the sprinkler pipe or boom, supplying water to the sprinkler heads or nozzles, as a radius from the center of the field to be irrigated. Water is delivered to the center or pivot point of the system. The pipe is supported above the crop by towers at fixed spacings and propelled by pneumatic, mechanical, hydraulic, or electric power on wheels or skids in fixed circular paths at uniform angular speeds. Water is applied at a uniform rate by progressive increase of nozzle size from the pivot to the end of the line. The depth of water applied is determined by the rate of travel of the system. Single units are ordinarily about 1,250 to 1,300 feet long and irrigate about a 130-acre circular area;
- [2] **Drip** — A planned irrigation system in which water is applied directly to the *Root Zone* of plants by means of applicators (orifices, emitters, porous tubing, perforated pipe, etc.) operated under low pressure with the applicators being placed either on or below the surface of the ground;
- [3] **Flood** — The application of irrigation water where the entire surface of the soil is covered by ponded water;
- [4] **Furrow** — A partial surface flooding method of irrigation normally used with clean-tilled crops where water is applied in furrows or rows of sufficient capacity to contain the designed irrigation system;
- [5] **Gravity** — Irrigation in which the water is not pumped but flows and is distributed by gravity;
- [6] **Rotation** — A system by which irrigators receive an allotted quantity of water, not a continuous rate, but at stated intervals;
- [7] **Sprinkler** — A planned irrigation system in which water is applied by means of perforated pipes or nozzles operated under pressure so as to form a spray pattern;
- [8] **Subirrigation** — Applying irrigation water below the ground surface either by raising the water table within or near the root zone or by using a buried perforated or porous pipe system that discharges directly into the root zone;
- [9] **Traveling Gun** — Sprinkler irrigation system consisting of a single large nozzle that rotates and is self-propelled. The name refers to the fact that the base is on wheels and can be moved by the irrigator or affixed to a guide wire;
- [10] **Supplemental** — Irrigation to insure increased crop production in areas where rainfall normally supplies most of the moisture needed;
- [11] **Surface** — Irrigation where the soil surface is used as a conduit, as in furrow and border irrigation as opposed to sprinkler irrigation or subirrigation.

Irrigation Canal — A permanent irrigation conduit constructed to convey water from the source of supply to one or

more farms.

Irrigation Conveyance Loss and Waste — The loss of water in transit from a reservoir, point of diversion, or ground water pump (if not on farm) to the point of use, whether in natural channels or in artificial ones, such as canals, ditches, and laterals.

Irrigation Delivery Requirement, Farm — The amount of water in acre-feet per acre required to serve the irrigated area. It is the crop irrigation requirement plus farm waste and deep percolation.

Irrigation Depletion — The amount of diverted water consumptively used, beneficially and nonbeneficially, in serving a cropped area. It is the gross diversion minus return flow and includes losses due to deep percolation.

Irrigation District — (1) Quasi-political districts created under special laws to provide for water services to property owners in the district. (2) In the United States, a cooperative, self-governing public corporation set up as a subdivision of the state government, with definite geographic boundaries, organized and having taxing power to obtain and distribute water for the irrigation of lands within the district; created under the authority of a state legislature with the consent of a designated fraction of the landowners or citizens and having taxing power. Also see *Truckee-Carson Irrigation District (TCID) [Nevada]*.

Irrigation Efficiency (I.E.) — (1) Basically, the efficiency associated with water application. (2) (Irrigation) The ratio of irrigation water used in *Evapotranspiration* to the water applied or delivered to a field or farm. This is one of several indices used to compare irrigation systems and to evaluate practices. (3) Generally, the loss of water in transit from a reservoir, point of diversion, or ground water pump to the point of use, whether in natural channels or in artificial ones, such as canals, ditches, and laterals. More specifically, the percentage of water applied, and which can be accounted for, in the soil-moisture increase for *Crop Consumptive Use*, i.e., the *Crop Requirement*. It is defined as the ratio of the volume of water required for a specific *Beneficial Use* as compared to the volume of water delivered, or applied, for this purpose. It is commonly interpreted as the volume of water stored in the soil for *Evapotranspiration* compared to the volume of water delivered for this purpose, but may be defined and used in different ways. The *Distribution Uniformity (DU)* of a field's irrigation system is one of the limiting factors of a system's irrigation efficiency.

Irrigation Frequency — Time interval between irrigations.

Irrigation Lateral — A branch of a main canal conveying water to a farm ditch; sometimes used in reference to farm ditches.

Irrigation Leaching Requirement — The amount of water required to move residual salts out of the root zone and maintain an adequate soil-salt balance for crop production. Also referred to as *Crop Leaching Requirement*.

Irrigation Period — The number of hours or days that it takes to apply one irrigation to a given design area during the peak consumptive-use period of the crop being irrigated.

Irrigation Pit — A small storage reservoir constructed to regulate or store the supply of water available to the irrigator.

Irrigation Releases — Refers to those waters released from storage primarily for irrigation. Does not include *Precautionary Drawdowns*.

Irrigation Requirement, Crop — The amount of irrigation water in acre-feet per acre required by the crop; the quantity of water, exclusive of precipitation, that is required for production of a specific crop. It is the difference between *Crop Consumptive Use* or *Crop Requirement* and the effective precipitation for plant growth. To this amount the following items, as applicable, are added: (1) irrigation applied prior to crop growth; (2) water required for leaching; (3) miscellaneous requirements of germination, frost protection, plant cooling, etc.; and (4) the decrease in soil moisture should be subtracted.

Irrigation Return Flow — Applied water which is not consumptively used, that is, water that is not transpired, evaporated, or deep percolated into a ground water basin, and returns to a surface or ground water supply. In cases of water rights litigation, the definition may be restricted to measurable water returning to the stream from which it was diverted, thereby excluding waters used for deep percolation and salt leaching. Also see *Crop Leaching Requirement* and *Irrigation Leaching Requirement*.

Irrigation Season — The period when irrigation water is delivered for agricultural purposes.

Irrigation Season [Newlands Project, Nevada] — Traditionally, water is delivered to the Newlands Project in Churchill County, Nevada, from March 15th through November 15th, subject to weather conditions and water availability.

Irrigation Structure — Any structure or device necessary for the proper conveyance, control, measurement, or application of irrigation water.

Irrigation, Supplemental — An additional irrigation water supply which supplements the initial, or primary supply.

Irrigation Systems — See *Irrigation*.

Irrigation Systems Tailwater Recovery — A water runoff collection and storage system to provide a constant

quantity of water back to the initial system or to another field.

Irrigation Water — Water diverted or pumped for irrigation of crops or pasture. It does not include undiverted water which naturally floods unimproved pastures by overflow during high-runoff years, and water which may beneficially subirrigate land for which no other source of water is diverted.

Irrigation Water Management — The use and management of irrigation water where the quantity of water used for each irrigation is determined by the water-holding capacity of the soil and the need for the crop, and where the water is applied at a rate and in such a manner that the crop can use it efficiently and significant erosion does not occur.

Irrigation Water Requirement — (1) The quantity, or depth, or water in addition to precipitation, required to obtain desired crop yield and to maintain a salt balance in the crop root zone. (2) The total quantity of water, exclusive of effective precipitation, that is required for crop production, to include crop consumptive use, leaching requirements, and on-farm conveyance losses.

Irrigation Water Use (Withdrawals) — Artificial application of water on lands to assist in the growing of crops and pastures or to maintain vegetative growth on recreational lands, such as parks and golf courses. The terms “water use” and “water withdrawals” are equivalent, but not the same as *Consumptive Use* as they do not account for return flows. Also see *Irrigation Return Flow*.

Island — A land mass, especially one smaller than a continent, entirely surrounded by water. Also see *Biome*.

Islet — A small or minor island.

Isobar — A line on a weather map connecting points of equal atmospheric pressure. Also referred to as *Isopiestic*.

Isobath — An imaginary line on the earth’s surface or a line on a map connecting all points which are the same vertical distance above the upper or lower surface of a water-bearing formation or aquifer.

Isochrone — Plotted line graphically connecting all points having the same time of travel for contaminants to move through the saturated zone and reach a well.

Isoconcentration — Graphic plot of points having the same contaminant concentration levels.

Isohyet — A line drawn on a map connecting points that receive equal amounts of rainfall.

Isohyetal — Indicating equal rainfall, generally expressed as lines of equal rainfall.

Isohyetal Line — A line drawn on a map or chart joining points that receive the same amount of precipitation. Also referred to as an *Isohyet* and *Isopluvial Line*.

Isopiestic — Having, or denoting, equal pressure; *Isobaric*.

Isopleth — A graph showing the occurrence or frequency of any phenomenon as a function of two variables

Isotherm — A line drawn on a weather map or chart linking all points of equal or constant temperature.

Isothermy — In *Limnology*, a state in which a lake is at the same temperature throughout and is well-mixed. Periods of isothermy occur in Spring and Autumn in *Dimictic Lakes*.

Isotopes — Isotopes are varieties of a chemical element that differ in atomic weight, but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus. For example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.543. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes (*Radioisotopes*).

Isotropy — That condition in which a medium has the same properties in all directions.

Isthmus — A narrow strip of land connecting two larger masses of land.